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ABSTRACT

Background: University libraries are considered as the heart of the university because they perform a central role for both researchers and students. The primary responsibility of university libraries is t to provide a research environment that helps to advance the knowledge of students and researchers.

Purpose: The study aimed to examine the automated circulation services and features in the university central/main libraries of Lahore.

Method: The quantitative research approach based on the survey method was opted to meet the objectives of this study. Main / Central libraries of universities of Lahore listed on the website of Higher Education Commission (HEC) till February 01, 2019, were selected as the population to conduct the survey.

Findings: The study revealed that the majority of the universities had started automated circulation services in their libraries. Koha was the most used integrated library software, followed by LIMS and others. The study found that different barriers of automation are confronted by librarians, such as lack of funds, non-availability of standard software, high cost of proprietary software, and retrospective conversion.

Originality/value: This is the pioneer paper that gives insight into the status of automated library circulation services in Pakistan. Library software that was used for circulation services, the impact of automated library circulation services, and barriers

confronting by the librarians to automate library circulation services were pointed out.

***Keywords*:** Automated Circulation Services, Automated Library Circulation, Library Automation, Library Software, Impacts of Automation, Barriers of Automation

INTRODUCTION

In the contemporary world, the information should be arranged systematically in search of facts, but the evolution of information is prevailing in the aspects of gathering, organizing, storing, and dissemination of information. Information and Communication Technology (ICTs) has made it easier to perform the traditional library functions more effectively through library automation. Library automation involves different modules, including cataloging, acquisition, circulation, reference, serial, etc., while the circulation module being an important module among all of them.

Library automation is critical as it does not only enhance the efficiency of operations but also enables a library to meet the ever-evolving demands of its users (Chaputula and Kanyundo, 2019). Library circulation as a module of library automation is defined as "the orderly movement through a circuit, applied to the process of lending books to borrowers and then accurately re-shelving them after they have been returned so that they will be retrievable by the next user" (Battaile, 1992, p. ix).

Wijayaratne (2005) described that proficient library circulation services have a pivotal role in improving the status of the library. Freedman (1981) described that circulation services are vital for libraries because significant circulation functions are to satisfy library users with the provision of required material in a short time.

Previously published literature described that an attractive and efficient circulation desk could boost the library image more positive and appealing (Wijayaratne, 2005). Eventually, the circulation section is the forefront section of the library; when a patron enters the library, he/she could find the long line of people who were waiting for their turn to check-in or check-out of the library material. Therefore, check-in and check-out are becoming a quicker process through the help of automated library circulation systems. Ayre (2015, p.145) stated that "selecting technologies and making recommendations about how to optimize their use is the easy part. The harder part is helping libraries transition from their traditional staff-based circulation workflows to self-service workflows, which free up staff to focus on other patron needs without the constraints and structure provided by the traditional circulation desk model." Kawthar *et al*. (2015) described in their study that a database management system/program used for the addition of books in the database, issue dates of material, return dates of material, fine payments, borrowers record. This database system is called Circulation Management System (CMS).

University libraries are considered as the heart of the universities because these libraries perform a central role for both researchers and students. The fundamental responsibility of university libraries is the provision of a research environment that helps to advance the knowledge of students and researchers. It is necessary to perform services like collecting information, storing information, and disseminating the information for effective utilization of information in the academic and scholarly community. These services are rendered by librarians and library staff divided into different sections like the circulation section, acquisition section, cataloging section, serial, and reference sections to satisfy their clients according to their requirements and interest. Eventually, students and researchers heavily rely on

university libraries to search for their relevant material and information to achieve their goals and targets (Musa, 2016).

The available literature in the field of library and information science in Pakistan revealed that different studies had been reported on library automation, which discussed automated modules, software, integrated library systems, and library management systems for the library. These studies discussed automated circulation services as a part of their studies, and only a few studies, which tried to discuss automated circulation services in detail, but this has not been discussed as a separate venture. So, there is a dire need to discuss the status of automated circulation services with maximum elements/aspects as a separate venture. Therefore, this study tried to investigate the status of automated circulation services in the university libraries of Lahore. This study is designed to explore that which software has been used for automated circulation services and which services have been provided by different institution libraries in their library circulation section or department. Apart from this, different impacts of automated circulation services were tried to explore, and confronting barriers by librarians was also pointed.

Research Questions

This study formulated the following research questions:

1. Which software packages are in use for library circulation services?
2. What is the present status of automated library circulation services?
3. Which automated circulation functions and services are available in university libraries?
4. What are the impacts of automation on library circulation services?
5. What are the barriers confronting the librarians to automate the circulation services?

Literature Review

In the late 1970s, before the advent of integrated library systems, the circulation operations were firstly intended to computerize. The circulation control system was integrated with the catalog module, and vendors were offering a circulation system with an online public access catalog from the late 1970s; these functionalities expanded their products as a library management system (Saffady, 1999, p.45).

Automation has been impacting circulation since the advent of computers in the field of library organizations. As Surace (1972) described the impacts and benefits of automation on circulation functions in observed models: a complete record of holdings from circulation file; file accuracy; up-to-date information of circulation activities such as charges, overdue, reserves and renewals; automated updates of file through a computer system; automatic due notices of fines and overdue; borrower did not fill charge slips; feedback of circulation detail to renewal subsystems and acquisition; statistics derived from classifications, charges, discharges, reserves, and renewals.

Musa (2016) conducted the study "Development and Validation of Circulation Software Package for Libraries in Federal Universities of North Central, Nigeria" and concluded the importance of library automation systems that many benefits can be availed from automated library systems as online interlibrary loans facility can be availed at decent charges.

Egunjobi and Awoyemi (2012) conducted a study on the execution of the Koha library management system in Adeyemi College of Education Library; they discussed the processes of automation during the development of Koha in the library.

As far as the concern of circulation services, the web-based circulation interface was developed to handle the charge, discharge, and renewal functions (Egunjobi and Awoyemi, 2012).

Madhusudhan and Singh (2016) analyzed the different functions and features of four library management systems Koha, Libsys, NewGenlib, and Virtua, which ranked them according to their features and services. They analyzed 306 functions and features under ten broad categories. Different modules and features were observed and evaluated. Similarly they pointed out that the circulation modules performed 32 automated circulation functions, in which 26 were circulation others were reporting features.

In the contemporary period, literacy of technology is increased among patrons and staff. Therefore, self-service technology is getting famous for library circulation activities. Wu and Wu (2018) conducted a field survey among users who were using self-services to issue and return system in the public library of Taiwan to understand the behavior of users to use the self-service skills. The results concluded that the intention towards self-service technology was positive and beneficial, and patrons showed interest in using the technology because it facilitated users in the process of borrowing and returning material directly.

Available literature in Pakistan about the library and information science does not provide in-depth information about automated circulation services. Different studies have been conducted which discussed integrated library systems, library management systems, open-source software, OPACs, proprietary library software, etc. These studies focused on overall library automation and discussed all sections of the library, but very few studies focused on circulation services separately. There is

an overall shortage in the literature that discussed automated circulation services separately. Mahmood (1996) described that library automation at the international level was started in the 1950s, but the history of library automation in Pakistan started in the 1980s, and after that, different libraries started to computerize their library functions.

Mahmood (1996) conducted a study to know about the status of automation in libraries of Pakistan. Different internationally developed database management systems like dBase, Foxpro, Inmagic, CDS/ISIS, and MINISIS were discussed. These packages were used for library housekeeping routines in Pakistan. These library management systems had modules such as acquisition, circulation, cataloging, serials control, authority files, management reports. Circulation module also included, and the provision of automated circulation services made it possible to perform functions like borrower's record, checkin/out, reservation, calculation of fines.

Siddique and Mahmood (2015) conducted a survey study to investigate the position of integrated library systems (ILS) and software that had been used in the libraries of Higher Education Institutes of Pakistan. Data were gathered through questionnaires from heads of main libraries of institutes. The findings showed that the 77 number of libraries started automation for their libraries, and 37 software packages were used. Among them, the free available software LIMS was on the top of the list with a high frequency of use.

In another study, Siddique and Mahmood (2016) explored the current status of library software and combating problems that hindered to libraries for automation and the solutions of these problems through the opinion of library personnel. The Qualitative research approach was used to get the opinion from three focus groups of library and information science professionals. The study showed the status of

software in Pakistan was very low because most libraries had not any proper automated software packages. A large number of libraries were using in-house developed automated packages, such as MLIMS used by the library of the University of Punjab, which is customizable according to the requirements of the university administration.

Khan *et al.* (2016) conducted a study that elaborated the migration process of library data from one old software, Library Management Software (LMS), to new open-source software Koha, the main purpose of this paper was to elaborate implementation procedure of Koha in Government College University (GCU) library, Lahore where the LMS was implemented since 1999. The study addressed some major issues that were faced during the implementation process. The main purpose of the study to encourage professionals to go ahead and choose better systems without hesitation.

Library automation was not started as early as developed countries in the world. Mahmood (1996) described that library automation at the international level was started in the 1950s, but the history of library automation in Pakistan started in the 1980s, and after that, different libraries started to computerize their library functions. The delayed start of library automation has various reasons and barriers, which also led hindrance to promote the technological culture in developing countries. As Rafiq and Ameen (2009) pointed out, some barriers (including, Not clear concept about Open Source Software (OSS), Shortage of funding support, Scarcity of financial resources, Lack of volunteer work culture, Absence of collaborative work environment, Low level of technological support, Lack of training programs, Scarcity of information technology professionals, Lack of required skills among library personals) that encountered in adoption of open source software in libraries of Pakistan.

Siddique and Mahmood (2014) reviewed the available literature to reveal the existing status of library software that had been used among central libraries of institutes recognized by the HEC of Pakistan. This study addressed issues and barriers that hindered the improvement of the situation of library automation in Pakistan. In another study, Siddique and Mahmood (2016) tried to explore the problems faced by higher education institutions in Pakistan, data collected through the opinion of experts in the field of library science, and they pointed different barriers of automation confronting by libraries in Pakistan.

Research Design

A quantitative research approach based on the survey method was used to achieve the research objectives of the study. Gay and Geoffrey (2012, p.7) defined quantitative research as "the collection and analysis of numerical data to describe, explain, predict, or control phenomena of interest". **The population of this study was comprised of Main / Central libraries of universities of Lahore specified on the Higher Education Commission (HEC) website till February 01, 2019**. Three universities were excluded due to non-functionality (i.e., Punjab Tianjin University of Technology, Virtual University, and Hajvery University). A total of 38 universities, including both public (17) and private (21) sector universities were included in the study, and circulation librarian or concerned librarian who dealt with circulation section activities in main campus libraries were approached to fill the questionnaires. A comprehensive questionnaire was developed after reviewed and took guidance from the questionnaires used by Siddique and Mahmood (2015) and Rafiq and Ameen (2009). The questionnaire was revised by a board of experts (Library & Information Science faculty members and librarians) for content validation, and suggestions of

experts helped in further refining the questionnaire. The self-composed questionnaire was comprised of four Sections; A, B, C, and D, to collect data from university libraries of Lahore. Section A contained questions related to knowing about the status of automated library circulation services and the software packages which have been used. It was also tried to know about any other additional software and security system for circulation services. Section B of the questionnaire consisted of 39 items that investigated available automated circulation services in the particular university libraries by using dichotomous scale. Section C of the instrument comprised 16 items investigated the impacts of automation on circulation services. The fourth section (D) of the instrument, which contained 15 items, investigated the barriers of automation that were confronted by librarians to adopt automation. The third and Fourth Sections used Likert scale ranges, which consisted of Strongly Disagree to Strongly Agree. The questionnaire was circulated among targeted university libraries from 13th March 2019, and responses were received successfully till 27th March 2019. Offline data were also collected during the said period. Most responses were received by 20th March 2019, and the rest of the responses were also received after follow-up calls and reminders.. Responses were collected only from the concerned library staff dealing with library software or circulation services. Statistical Package for the Social Sciences (SPSS version 22) was utilized to elaborate and analyze the collected data. The data was entered in the SPSS statistically and formulated different types of procedures, such as frequency distribution, multiple frequency distribution, cross-tabulation, independent t-test, ANOVA test for variance analysis, and descriptive statistics.

Data Analysis and Findings

Data were collected from the selected HEC recognized university libraries of Lahore. The findings are interpreted and presented here.

The information regarding the distribution of participated universities showed (Table 1) that 21 (55%) universities belong to the private sector while slightly less than half, 17 (45%), belong to the public sector. The total number of libraries was thirty-eight.

Table 1: *Distribution of Participated Universities (n-38)*

Institute Type	Frequency	Percentage%
Public	17	45
Private	21	55
Total	38	100.0

The status of the library staff data showed (Table 2) that different library professionals with different designations responded to answer the research questions regarding automated circulation activities. Among them, 20 (52.6%) librarians, followed by eight (21.1%) assistant librarians, five (13.2%) chief librarians, three (7.9%) senior librarians, and two (5.3%) library assistant participated in this survey.

Table 2: *Distribution of Respondents (n-38)*

Designations	Frequency	Percentage%
Chief Librarian	5	13.2
Senior Librarian	3	7.9
Librarian	20	52.6
Assistant Librarian	8	21.1
Library Assistant	2	5.3
Total	38	100.0

To identify about the position of automated circulation activities performed in libraries, the respondent library professionals were asked questions to answer their status of library setting, whether it is automated or manual. Table 3 reflects the number of automated

libraries, which also confirms the claim of Shafique and Mahmood (2008) that the majority of libraries in Lahore are automated.

Table 3: *Status of Automation in University Libraries of Lahore (n-38)*

Rank	Library Status	*'f'*	%
1	Automated	35	92
2	Manual Setting	3	8
	Total	38	100.0

The statistics of software usage in libraries (Table 4) shows that Koha got first in the table as 15 (39.5%) libraries are using it, followed by LIMS in nine (23.7%) libraries, Virtua in two (5.3%) libraries, LMS in two (5.3%) libraries, and Alice for windows in one (2.6%) library, CU online in one (2.6%) library, Insignia in one (2.6%) library, LAMP in one (2.6%) library, Libxol in one (2.6%) library, MLIMS in one (2.6%) library, Winisis in one (2.6%) library, and no software were used in three (7.9%) libraries.

Table 1: *Software being Used for Automated Library Circulation (n-38)*

Rank	Software	*F*	%
1	Koha	15	39.5
2	LIMS	9	23.7
3	Virtua	2	5.3
4	LMS	2	5.3
5	Alice for Windows	1	2.6
6	CU Online	1	2.6
7	Insignia	1	2.6
8	LAMP	1	2.6
9	Libxol	1	2.6
10	MLIMS	1	2.6
11	Winisis	1	2.6
12	No Software	3	7.9
	TOTAL	38	100.0

To explore the type of software use by the respondent libraries, it was further asked to mention the type of software (Table 5). A majority of 23 (60.5%) were using open-source software, followed by seven (18.4%) proprietary, and five (13.4%) were using in-house developed software.

Table 2: *Frequency of Software by Type (n-38)*

Rank	Type of Software	*f*	%
1	Open Source	23	60.5
2	Proprietary	7	18.4
3	In housed developed	5	13.2
4	No Software	3	7.9
	Total	38	100.0

Respondents were asked to mention the use of a theft control system for automated library circulation activities. Table 6 indicates that 14 (37%) libraries declared that they had theft control systems in their university central/main libraries, and 24 (63%) libraries declared that they had no theft control system in their university central/main libraries.

Table 3: *Frequency of Theft Control System (n-38)*

Theft Control	*f*	%
Yes	14	37
No	24	63
Total	38	100.0

To know more about the theft control system, the respondents who mentioned that they had a theft control security system installed in the library circulation section were further requested to mention which type of theft control system has been used. The result showed that there was not a significant majority in regards to theft security system. Seven (18.4%) libraries installed Radio Frequency Identification (RFID) security system, four (10.5%) adopted RF security system, four (10.5%) libraries using Magnetic Security system, and only one (2.6%) library using tattle tap strip for theft control system as mentioned in Table 7.

Table 4: *Types of Theft Control System (n-38)*

Rank	Theft Security System	*f*	%
1	RF	4	10.5
2	RFID	7	18.4
3	Tattle tap strip	1	2.6
4	Magnetic Security System	4	10.5
5	No Theft Security	22	57.9

Total	38	100.0

Furthermore, respondents were requested to mention any other added technology that assists in automated circulation functions in their libraries. Table 8 shows that the majority of libraries 20 (52.6%) were using the Barcode system for their circulation module, four (10.5%) were using RFID for circulation module, and fourteen (36.8) were not using any other technology for their circulation module.

Table 5: *Additional Technology for Circulation System (n-38)*

Additional Technology	*f*	%
RFID	4	10.5
Barcode	20	52.6
No Additional Technology	14	36.8
Total	38	100.0

To explore the automated circulation functions and services in the main libraries of the Higher Education Commission recognized universities, a checklist of various features and services was prepared. The respondents were asked to check the relevant box to depict the availability and missing features in their automated circulation environment or library software. The results of this section are in lieu of the study Siddique and Mahmood (2015) that tried to know about the available automated circulation feature and services. This study also shows the availability and required features and services in the respondent libraries; the frequency table was prepared according to the ranking of percentage, as shown in Table 9.

The first and foremost question in this checklist was the availability of the circulation module in their library software, so the situation found very satisfactory because every library had a circulation module that had library software. Therefore, the usability of the circulation module was found a hundred percent because out of 38 libraries, 35 (92%) had library software, and all they had a circulation module. Similarly, 35 (92%) libraries had customizable data entry forms to register their patrons in the

circulation module. As for as the support of MARC format to register patron information is concern, 23 (61%) libraries had the facility of MARC format, and 15 (39%) libraries need to avail of this facility. The frequency of the availability of expiry date in the registration form of membership is 34 (89%), and only four (11%) libraries had not this facility in their software. Frequency Distribution of remaining Circulation Services / Features are tabulated in Table 9.

Table 6: *Frequency Distribution of Circulation Services / Features (n-38)*

Statement	Available Services		Required Services	
	'f'	%	*'f'*	%
Does your software have a circulation module?	35	92%	3	8%
Does your software provide a customizable data entry form to register patrons?	35	92%	3	8%
Is there any membership expiry date available in the patron registration form?	34	89%	4	11%
Is there a facility to see the history of item transactions?	34	89%	4	11%
Is there a facility to see the history of patron transactions?	34	89%	4	11%
Is there a facility to perform daily statistics of all circulation transactions?	32	84%	6	16%
Is there a facility to attach a digital photo to patron's record?	31	82%	7	18%
Is there any facility to block and unblock patron account?	31	82%	7	18%
Is there a facility to print transaction receipts?	29	76%	9	24%
Is there a facility to manage different kind of payments like overdue fine, compensation against damage, and lost items?	28	74%	10	26%
Is there a facility to renew or return more than one item at a time?	28	74%	10	26%
Does your software provide a facility to register patron information in MARC format?	23	61%	15	39%
Do you have an offline circulation option in case the server is down?	23	61%	15	39%
Is there a facility to see all transactions like checkout/in, renew separately?	23	61%	15	39%
Is there a facility to checkout/in items in back dates?	23	61%	15	39%
Can the checked-out interface show total fines and the number of over-due items of the patron?	23	61%	15	39%
Is there a facility to checkout items for some specific period rather than a regular period?	21	55%	17	45%
Is there a facility to modify the circulation interface?	21	55%	17	45%
Can the offline transactions be uploaded automatically after the system is up?	18	47%	20	53%
Can a patron automatically be blocked if he/she has a fine over the specific limit?	18	47%	20	53%
Is there a facility to check the number of overdue	18	47%	20	53%

notices sent to a patron on any item?				
Is there a facility to generate e-mail automatically to patrons about reserved items?	17	45%	21	55%
Is there a facility to reserve an item online?	16	42%	22	58%
Is there a facility to generate e-mail automatically to patrons about overdue notices?	16	42%	22	58%
Is there a facility to generate automatic overdue notices?	16	42%	22	58%
Is there a facility to reissue an item online?	15	39%	23	61%
Is there a facility to generate e-mail automatically to patrons about the fine?	15	39%	23	61%
Is there a facility to archive the financial transactions of each patron?	15	39%	23	61%
Does the system have the ability to checkout non-cataloged items?	14	37%	24	63%
Does the system provide a self-checkout/check-in facility?	13	34%	25	66%
Does your system have the Inter Library Loan (ILL) facility?	13	34%	25	66%
Does your library software support a self-check-in/out facility?	13	34%	25	66%
Is there a facility to send overdue notices through SMS?	10	26%	28	74%
Is there a facility to send fine notices through SMS?	10	26%	28	74%
Does the system accept partial payment of fine?	10	26%	28	74%
Does your software allow sets of items to circulate as a group?	9	24%	29	76%
Does your library software support dropbox to return books and print receipts?	7	18%	31	82%
Is there a facility to associate patrons with each other like a family or a group and allow them to have access to each other's accounts?	6	16%	32	84%
Does the system accept credit card payments for patron fines?	2	5%	36	95%

To know about the overall frequency and percentage of available and required features based on the public and private sector, the cross-tabulation test was applied, as shown in Table 10. It was found that the available feature and services percentage is 22% in public and 31% in private section university libraries, and the overall percentage is 53%. On the other hand, the level of required services and features found 23% in the public sector, 24% in the private sector, and overall required services frequency found 47% in university main libraries.

Table 7: *Cross Tabulation between Available and Required Services Usage (n-38)*

Software Type	Available Use		Required Use	
	f	%	*f*	%
Public	321	22%	342	23%
Private	458	31%	361	24%
Total	779	53%	703	47%

To know about the available features and services based on software type used by the respondent libraries, an ANOVA test was applied, as shown in Table 11. No significant difference was found in overall services and features that are available in the software on the basis of software type (*f*=1.635, Sig. = 211).

Table 8: *ANOVA Test Based on Type of Software (n-38)*

Type of Software	Mean	SD	*f*	Sig.
Open Source	57.09	7.57	1.635	.211
Proprietary	51.43	6.55		
In housed developed	55.60	6.39		

All respondents of libraries were asked to review the impacts of automation on automated circulation services. The majority of professionals were agreed with statements of impacts of automation on circulation services as most of the statements scoring above 4.00 mean and only three statements were below 4.00 mean. Table 12 shows that the results indicate that majority of respondents were agree with the statements of the impacts of automation, which has an influence on circulation services.

Table 9: *Impacts of automation on circulation services (n-38)*

Statement	Mean	SD
Automation improves circulation functions and activities	4.50	.647
Automation improves the speed of circulation procedures	4.34	.745
Automation reduces the staff of circulation sections.	3.97	.915
Automation increases the security efficiency	4.26	.554
Automation decreases the theft issues	4.05	.868
Automation helps in statistics control of a library	4.26	.554
Automation helps to provide up-to-date information	4.24	.675
Automation reduces the burden of circulation staff	4.11	.764
Automation improves the stack maintenance activities	4.08	.818
Automated circulation services invoke the ease of use	4.11	.798
Automation provides better management of holdings	4.21	.741
Automation helps to track the location of the material	4.21	.935
Automation encourages self-check-in and self-check-out activities	4.16	.718
Automation provides better inventory control	4.18	.692
Automation improves documentary delivery activities	3.92	1.050
Automation increases the speed and efficiency of integrated library loan (ILL) services	3.84	1.001

Scale: Strongly Disagree =1 Disagree =2 Neutral = 3 Agree = 4 Strongly Agree = 5 *SD = Standard Deviation

An independent t-test was applied to discover the variation of opinions among public sector university participants and private sector university participants to know the effects of automation on library circulation services. Table 13 shows the results that slightly difference found between the public sector and private sector groups on the following two statements. “Automation encourages self-check-in and self-check-out activities” and “Automation provides better inventory control” (p=.094) and (p=.142), respectively.

Table 10: *Impacts of Automation on Circulation Services by Type of Universities (t-test)*

Statement	Public Sector		Private Sector		t-test
	Mean	SD	Mean	SD	Sig.
Automation improves circulation functions and activities	4.41	.507	4.57	.746	.457
Automation improves the speed of circulation procedures	4.24	.752	4.43	.746	.434
Automation reduces the staff of circulation sections.	3.88	.697	4.05	1.071	.587
Automation increases the security efficiency	4.12	.485	4.38	.590	.148
Automation decreases the theft issues	4.00	.707	4.10	.995	.742
Automation helps in statistics control of library	4.18	.529	4.33	.577	.393
Automation helps to provide up-to-date information	4.18	.728	4.29	.644	.627
Automation reduce the burden of circulation staff	4.06	.659	4.14	.854	.741
Automation improve the stack maintenance activities	4.06	.899	4.10	.768	.894
Automated circulation services invoke the ease of use	4.24	.664	4.00	.894	.374
Automation provides better management of holdings	4.12	.697	4.29	.784	.494
Automation help to track location of material	4.12	.928	4.29	.956	.588
Automation encourages of self-check-in and self-check-out activities	3.94	.748	4.33	.658	.094
Automation provides better inventory control	4.00	.791	4.33	.577	.142
Automation improves the documentary delivery activities	3.88	1.054	3.95	1.071	.841
Automation increases the speed and efficiency of integrated library loan (ILL) services	3.76	.970	3.90	1.044	.674

Respondents further asked to review the barriers of automation on circulation services that confronting by the librarians. The results were found similar to the studies of Anas *et al.* (2014) and Siddique and Mahmood (2016) about the barriers of automation confronting by librarians. Table 14 shows the descriptive statistics for responses of the respondents. All the respondents were agreed with statements of barriers of automation on circulation services confronting by the librarians. As the table reflects, the satisfaction level with the statements was agreed with statements by the respondents (with Mean=3.79+, Mean=4+). Therefore, results depict that participants agreed with the statements of barriers of automation, which have been confronting by the librarians.

Table 11: *Barriers of automation confronting by librarians (n-38)*

Statement	Mean	SD
Lack of Software	3.97	1.078
High cost of proprietary software	4.11	.924
Costly vendor support	3.97	1.026
Lack of information technology knowledge	4.32	.739
Insufficient IT policies	4.16	.823
Lack of standards	4.08	.850
Lack of staff coordination and skills	4.00	.900
Lack of trained staff	3.97	.944
Fear of change	3.84	1.103
Retrospective conversion	3.87	.991
Multilingual nature of the material	3.79	.991
Insufficient Funds	4.34	.781
Lack of budget	4.47	.647
Lack of support from higher authorities	4.08	.912

An independent t-test was used to understand the variation in opinions of public sector university respondents and private sector university respondents about the barriers of automation confronting by librarians for library circulation services. Table 15 shows the results of this test that substantial variation was found between the public sector and private sector respondents in three statements. “Lack of Software”, “High cost of proprietary software” and “Costly vendor support” (p=.046), (p.004) and (p=.035), respectively.

Table 12: *Barriers of Automation for Circulation by Public and Private Sector (t-test)*

Statement	Public Sector		Private Sector		t-test
	Mean	SD	Mean	SD	

					Sig.
Lack of Software	3.59	1.326	4.29	.717	.046
High cost of proprietary software	3.65	1.115	4.48	.512	.004
Costly vendor support	3.59	1.228	4.29	.717	.035
Lack of information technology knowledge	4.35	.606	4.29	.845	.785
Insufficient IT policies	4.12	.857	4.19	.814	.790
Lack of standards	4.18	.728	4.00	.949	.532
Lack of staff coordination and skills	3.88	.928	4.10	.889	.476
Lack of trained staff	3.88	.857	4.05	1.024	.598
Fear of change	3.76	1.147	3.90	1.091	.703
Retrospective conversion	3.65	1.057	4.05	.921	.220
Multilingual nature of material	3.76	1.147	3.81	.873	.892
Insufficient Funds	4.35	.862	4.33	.730	.940
Lack of budget	4.35	.786	4.57	.507	.307
Lack of support from higher authorities	4.24	.831	3.95	.973	.349

Implications of the Findings

In Pakistan, library automation especially automated circulation service always been a neglected area. This is the first study that researched the current status of automated circulation services in university libraries. The findings of this study can help in the selection of appropriate automation software and also helpful to know the patterns and purposes of using automated circulations services in university libraries. The study provides guidelines to the software vendors to develop LMS keeping in view the needs of the university libraries of Pakistan. This study may be helpful for policy and decision-makers in Pakistan to consider automated circulation services as an effective way to serve the library users.

Conclusion and Recommendations

The results of the study show that automated circulation services in libraries have widespread effects on the daily routine practices of libraries. The nature of the routine task has changed from manual to automated features, and these are becoming more and more innovative and advanced day by day. The majority of the university's main libraries have been using library software to perform circulation activities. In addition, the majority of respondent libraries are using Open Source Software (OSS)

because its source code is freely available for developers. RFID and Barcode systems have been using as additional technology to support the automated library circulation system. The usability of features of the automated circulation system is quite satisfactory, but it cannot be compared with the international level because advanced features of automated circulation systems have not been implemented in most of the libraries, such as book dropbox and self-check in and out and automatic overdue notices type of features.

The study also shows that automation has influenced automated library circulation services and features because it improves efficiency, accuracy, and effectiveness in housekeeping activities of libraries. It is also revealed that there are some barriers, which hinder the automated circulation services. Therefore, it is required to overcome the barriers to improve automated circulation services and features.

The following recommendations are made for the improvement of circulation services in libraries. Radio Frequency Identification (RFID) technology has long-lasting benefits in the field of library circulation systems. Therefore, the integration of RFID technology with an integrated library system would be beneficial for automated library circulation services.

1. Standard library management systems should be adopted by university libraries to avail the maximum advanced features and services for the circulation related activities.
2. Universities should provide appropriate funds to their libraries for the adoption of standard library management systems.
3. Continuous training for professionals should be arranged, which will help to remove the fear of automating their circulation activities.

4. In order to promote the maximum use of features and services of library management systems, there is a need to conduct orientation programs and workshops to guide the students and teachers in this regard.

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